# Test Report n° TR_21077
*Rapporto di prova n° TR_21077*

# Environmental testing – Test A: Cold
# *Prove ambientali – Prova A: Freddo*

Ref: test procedure IL22001
*Rif: procedura di test IL 22001*

| | |
|---|---|
| **Product under testing**<br>***Prodotto testato*** | CPTOU4615 LS P3L3ARIO2H-4G1WTTSPFAEZ0 |
| **P/N**<br>***P/N*** | 993202033501 |
| **Lab Sample ID**<br>***ID campione*** | 20047 |
| **Received date**<br>***Ricevuto il*** | 15/03/2021 |
| **Derived models**<br>***Modelli derivati*** | 993202033500 / D_CPTOU4615 LS P3L3ARIEH------EZ0 |
| **Standard/Rev. Date/Ed.**<br>***Standard/Data Revisione/Ed.*** | **EN 60068-2-1:2007 – 2nd Ed.** – *Environmental testing – Part 2: Tests, Test A: Cold* |
| **Manufacturer**<br>***Costruttore*** | AESYS S.p.A. Via Pastrengo 7c<br>24068 Seriate (BG) Italia<br>Tel: +39.0352924111<br>www.aesys.com |
| **Start test date**<br>***Data inizio test*** | 15/04/2021 |
| **End test date**<br>***Data fine test*** | 16/04/2021 |
| **First issue**<br>***Prima emissione*** | 20/04/2021 |
| **Laboratory Technician**<br>***Tecnico di laboratorio*** | Sergio Fustinoni |
| **Lab Manager**<br>***Responsabile di laboratorio*** | Marco Verzeroli |
| **Verdict**<br>***Esito*** | **COMPLIANT** |
| **Revision**<br>***Revisione*** | 01 |
| **Revision date**<br>***Data revisione*** | 26/04/2021 |

| Revision | Reason | Name | Sign |
|---|---|---|---|
| 01 | | | |
| | | | |
| | | | |



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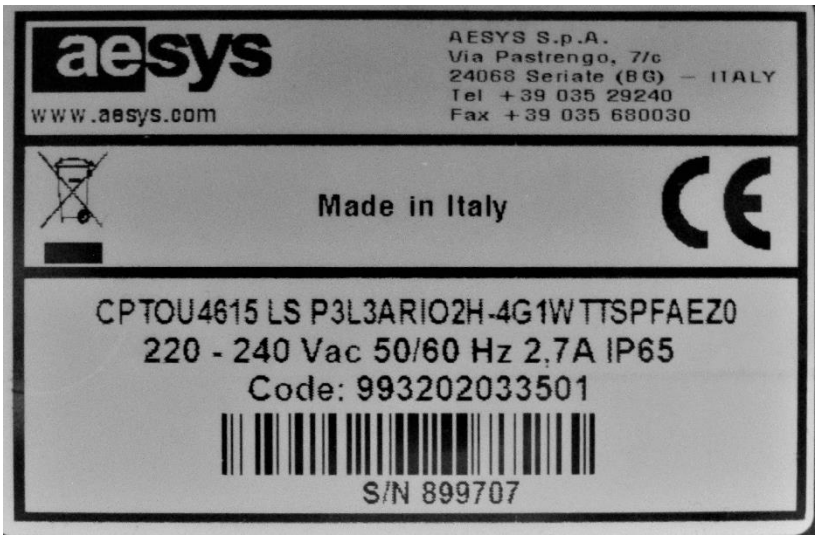
# 1 DUT – GENERAL PRODUCT INFORMATION
DUT – INFORMAZIONI GENERALI

The DUT (Device Under Test), CPTOU4615LSP3L3ARIO2H-4G1WTTSPFAEZ0, is a variable message panel based on TFT technology used for video-information in railways applications.

CPTOU4615 LS P3L3ARIO2H-4G1WTTSPFAEZ0




*DUT – Product identification label*



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## 2 TEST PROCEDURE
PROCEDURA DI TEST

Test performed according to Aesys internal procedure *IL 22001_Prova A - Freddo.*

## 3 TEST EQUIPMENT INFORMATION
INFORMAZIONI SULLA STRUMENTAZIONE UTILIZZATA

| ID | Description | Model | Manufacturer | Serial n° | Last Calibration Date | Next Calibration Date |
|---|---|---|---|---|---|---|
| 48 | Climatic room | CH2000D | Angelantoni Industrie | 7029 | 01/03/2021 | 03/03/2023 |
| 112 | Data acquisition control unit | MX100 | Yokogawa | 91N427912 | 24/06/2019 | 25/06/2021 |
| 290<br>356 | Data acquisition input unit | MX110 | Yokogawa | 91P527795<br>91S525693 | 24/06/2019 | 25/06/2021 |
| 142 | Wattmeter | WT230 | Yokogawa | 91F611778 | 24/06/2019 | 25/06/2021 |

## 4 TEST PARAMETERS
PARAMETRI DI TEST

**Test type:** **Cold (Part 2-1 Test A: Suffix letter Ad)**

**Test severity level:** **Temperature (°C):**

☐ -65
☐ -55
☐ -50
☐ -40
☐ -33
☐ -25
☒ -20
☐ -10
☐ -5
☐ +5
☐ Custom:

**Duration (h):**

☐ 2
☒ 16
☐ 72
☐ 96

**Environmental conditions:** Temperature range: 15°C to 35°C
Relative humidity: 25 to 75%
Pressure: 860 to 1060 hPa

**Test measurements uncertainty:** Temperature: ± 1°C

Measurement uncertainties estimated as extended uncertainty, obtained multiplying the standard uncertainty by the coverage factor *k* corresponding to a confidence level of about 95%.



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# 5 TEST SETUP

TEST SETUP

Test procedure according to EN 60068-2-1:2007 Clause 5.3.

Parameters and behaviors monitored:

| Parameter/Behaviour | Evaluation criteria |
|---|---|
| Mechanical check | No mechanical damage, no cracks |
| Electrical check | No electrical failure, no abnormal power consumption |
| Display check | Correct visualization of the define image |
| Communication check | No loss of data communication, data exchanged are correct |
| Temperature | Temperature below the limit (if present) |

List of thermocouples:

| Channel | Position | Side |
|---|---|---|
| 1 | GLASS OUTER CENTER | GLASS |
| 2 | TOP SX EXTERNAL GLASS | |
| 3 | LOWER RH EXTERNAL GLASS | |
| 4 | INNER GLASS CENTER | |
| 5 | TOP SX INTERNAL GLASS | |
| 6 | LOWER RH INTERNAL GLASS | |
| 7 | TFT FRONT CENTER | TFT |
| 8 | TFT FRONT UPPER LEFT | |
| 9 | TFT FRONT TOP RH | |
| 10 | TFT LOW FRONT LEFT | |
| 11 | TFT LOW FRONT RH | |
| 12 | TFT REAR PROBE (SENSOR) | |
| 13 | PC PROBE SINK | INTERIOR DY |
| 14 | TEMPERATURE PROBE 1609 | |
| 15 | PROBE POWER SUPPLY | |
| 16 | BOTTOM LEFT INTERIOR (EXCHANGER) | EXCHANGER |
| 17 | BOTTOM RIGHT INTERIOR (EXCHANGER) | |
| 18 | OUT UPPER INTERNAL LEFT (EXCHANGER) | |
| 19 | OUT TOP INSIDE RIGHT (EXCHANGER) | |
| 20 | LOW EXT LEFT (EXCHANGER) | |
| 21 | LOW EXT RIGHT (EXCHANGER) | |
| 22 | TOP EXT LEFT (EXCHANGER) | |
| 23 | TOP EXT RIGHT (EXCHANGER) | |
| 28 | EXTERNAL PROBE (CHAMBER TEMPERATURE) | CHAMBER |



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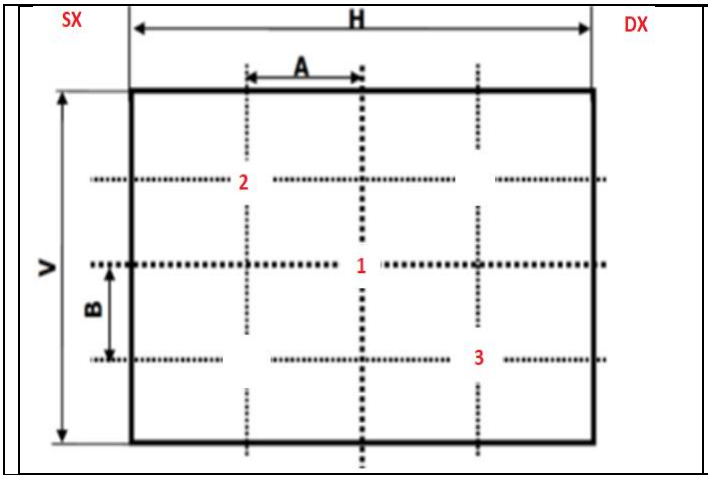
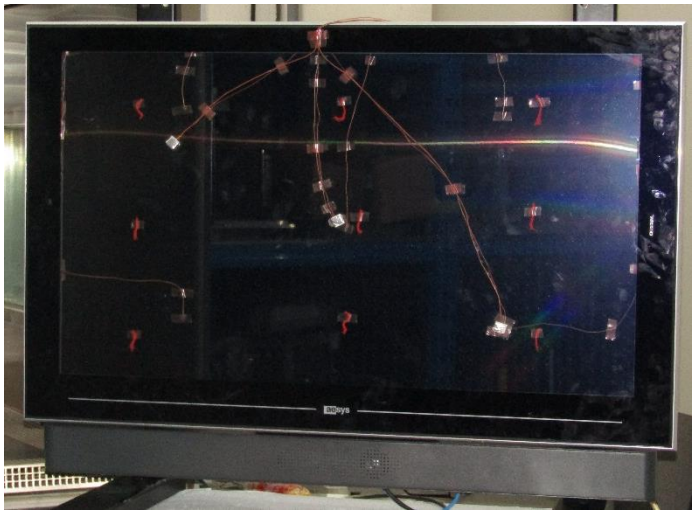
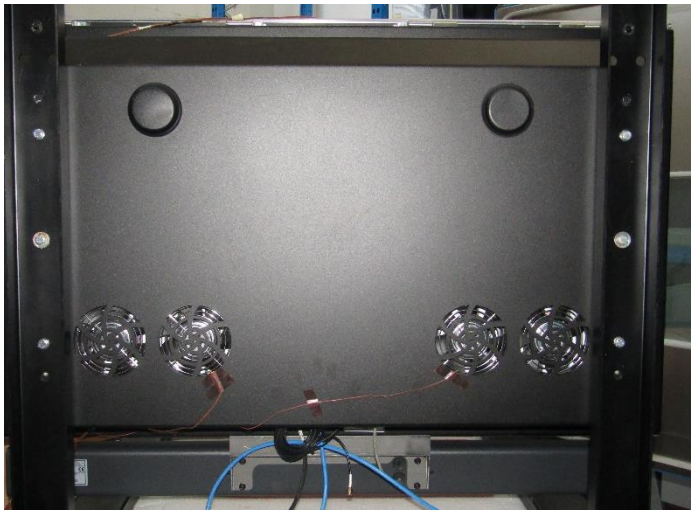
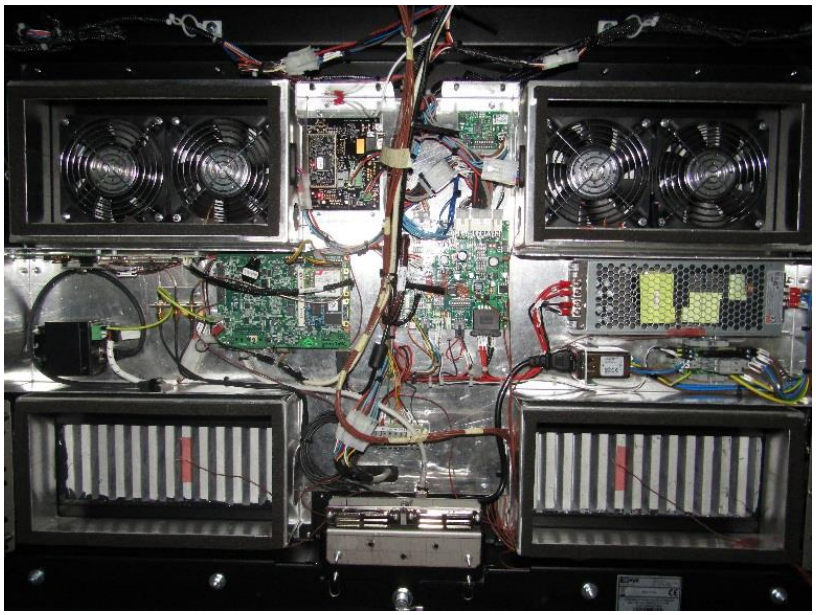
Thermocouples located in the following points:




Sx Observer = Sx Display
Dx Observer = Dx Display
A : H/4 mm
B : V/4 mm
@ H,V : Active Area







*Thermocouples positioning*



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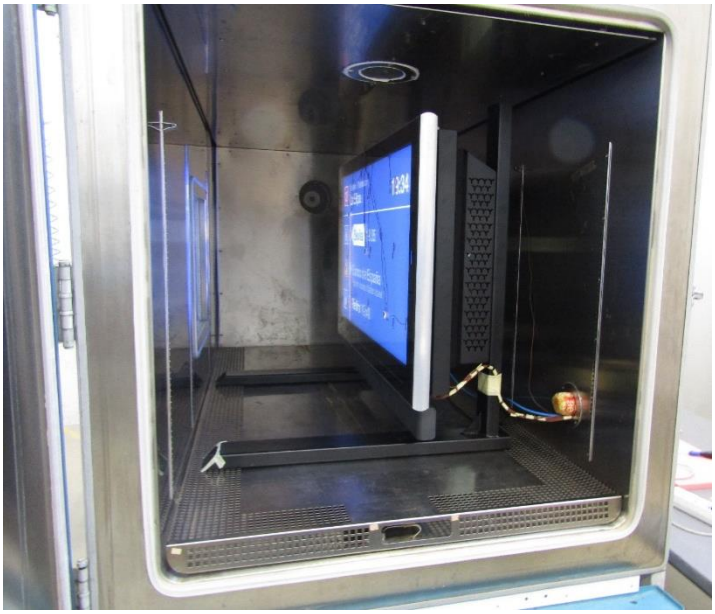
Test setup shown in the following pictures:



*Test arrangement*

# 6 TEST RESULTS
RISULTATI DEI TEST

## 6.1 Environmental conditions
*Condizioni ambientali*

| Test | Performance criteria | Result | Verdict |
|---|---|---|---|
| Environmental temperature | Between +15°C and +35°C | 21,5 °C | PASS |
| Relative humidity | Between 25% and 75% | 45,7 % | PASS |
| Pressure | Between 860 and 1060 hPa | 1009 hPa | PASS |

## 6.2 Startup verification
*Verifica iniziale*

| Test | Evaluation criteria | Result | Verdict |
|---|---|---|---|
| Mechanical check | No mechanical damage, no cracks | No mechanical damage | PASS |
| Electrical check | No electrical failure, no abnormal power consumption | Voltage: 225,4<br>Current: 1.2A<br>Power: 259.0W | PASS |
| Display check | Correct visualization of the define image | No loss of visualization | PASS |
| Communication check | No loss of data communication, data exchanged are correct | Constant communication | PASS |
| Temperature | Temperature below the limit (if present) | No temperature limit | PASS |



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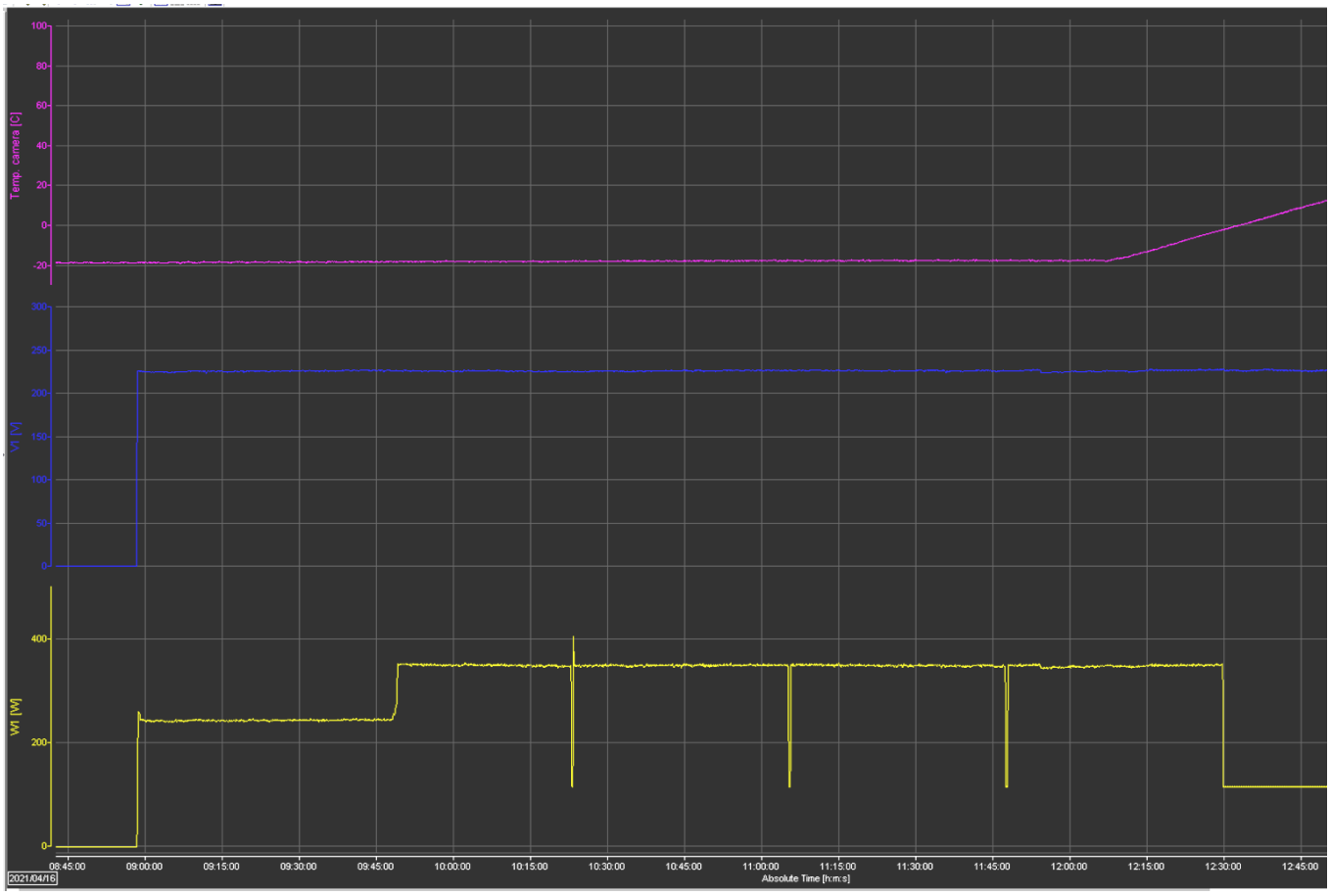
### 6.3 End test verification
*Verifica al termine del test*

| Test | Evaluation criteria | Result/Comments | Verdict |
|---|---|---|---|
| Mechanical check | No mechanical damage, no cracks | No mechanical damage | PASS |
| Electrical check | No electrical failure, no abnormal power consumption | Voltage: 224,0<br>Current: 0,6A<br>Power: 114,0W | PASS |
| Display check | Correct visualization of the define image | No loss of visualization | PASS |
| Communication check | No loss of data communication, data exchanged are correct | Constant communication | PASS |
| Temperature | Temperature below the limit (if present) | No temperature limit | PASS |

### 6.4 Test data Test data
*Dati del test*

The following graph shows the internal temperature, the environmental temperature and the power measured during the entire thermal cycle.




Absorption details -Temp.-Volt- Watt



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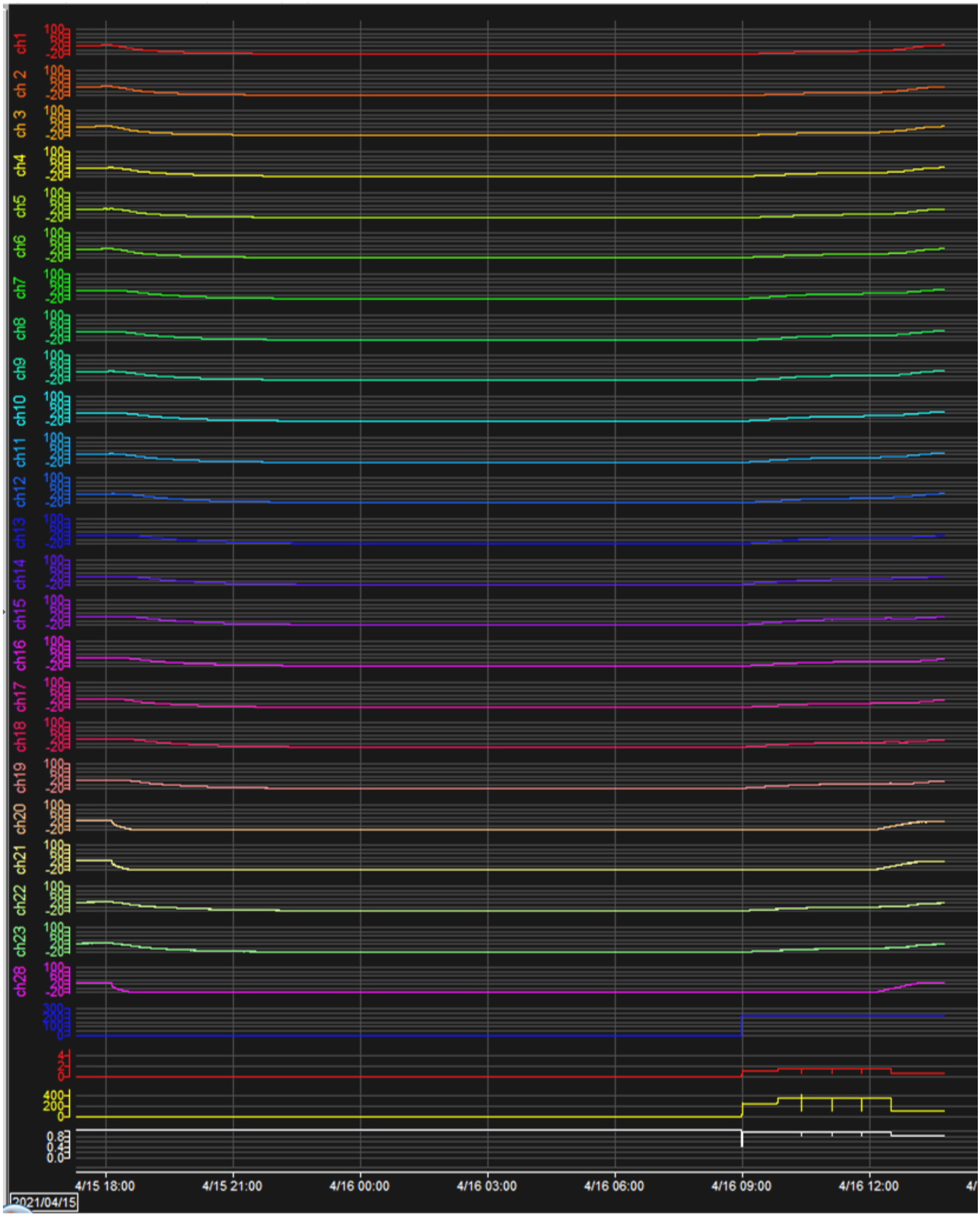


*Graph of the measured temperatures*



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The minimum temperatures are reported in the table hereunder:

| Channel | Position | Min. temperature measured after steady state (°C) |
|---|---|---|
| 1 | GLASS OUTER CENTER | -18.0 |
| 2 | TOP SX EXTERNAL GLASS | -18.1 |
| 3 | LOWER RH EXTERNAL GLASS | -18.2 |
| 4 | INNER GLASS CENTER | -17.9 |
| 5 | TOP SX INTERNAL GLASS | -18.1 |
| 6 | LOWER RH INTERNAL GLASS | -18.0 |
| 7 | TFT FRONT CENTER | -18.2 |
| 8 | TFT FRONT UPPER LEFT | -18.3 |
| 9 | TFT FRONT TOP RH | -18.3 |
| 10 | TFT LOW FRONT LEFT | -18.1 |
| 11 | TFT LOW FRONT RH | -18.2 |
| 12 | TFT REAR PROBE (SENSOR) | -18.4 |
| 13 | PC PROBE SINK | -18.7 |
| 14 | TEMPERATURE PROBE 1609 | -18.5 |
| 15 | PROBE POWER SUPPLY | -18.8 |
| 16 | BOTTOM LEFT INTERIOR (EXCHANGER) | -18.5 |
| 17 | BOTTOM RIGHT INTERIOR (EXCHANGER) | -19.0 |
| 18 | OUT UPPER INTERNAL LEFT (EXCHANGER) | -18.3 |
| 19 | OUT TOP INSIDE RIGHT (EXCHANGER) | -18.8 |
| 20 | LOW EXT LEFT (EXCHANGER) | -19.4 |
| 21 | LOW EXT RIGHT (EXCHANGER) | -20.2 |
| 22 | TOP EXT LEFT (EXCHANGER) | -18.2 |
| 23 | TOP EXT RIGHT (EXCHANGER) | -18.7 |
| 28 | EXTERNAL PROBE (CHAMBER TEMPERATURE) | -19.8 |

| Test | Evaluation criteria | Result | Verdict |
|---|---|---|---|
| Cold start test | No mechanical and electrical failure<br>No loss of performance<br>No thermal hazard | No mechanical and electrical failure<br>No loss of performance<br>No thermal hazard | **PASS** |

**6.5 Additional information / Notes:**
*Informazioni aggiuntive / Note:*

END OF TEST REPORT
*Fine del test report*



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